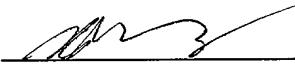


FORM PTO-1390 (REV. 1-98)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER M8540/185343
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 09/202758
INTERNATIONAL APPLICATION NO. PCT/GB97/01667	INTERNATIONAL FILING DATE 20 June 1997 (20.06.97)	PRIORITY DATE CLAIMED 21 June 1996 (21.06.96)	
TITLE OF INVENTION SALINE SOLUBLE INORGANIC FIBRES			
APPLICANT(S) FOR DO/EO/US JUBB, Gary Anthony, EATON, Paul Nigel, CANTY, Philip John, WASSELL, Alison Jane (formerly LOWE, Alison Jane)			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 37 (b) and PCT Articles 22 and 39(1). 4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. 5. <input checked="" type="checkbox"/> A copy of the International Application as published (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> has been transmitted by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). 6. <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)). 9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). 10. <input type="checkbox"/> A translation of the annexes of the International Preliminary Examination Report under PCT Article 36 11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.197 and 1.98 12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. 13. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. 14. <input type="checkbox"/> A substitute specification. 15. <input type="checkbox"/> A change of power of attorney and/or address letter. 16. <input checked="" type="checkbox"/> Other items or information: <p>Copy of International Preliminary Examination Report with replacement pages 1 and 2 of Description and pages 9-11 of Claims</p> <p>Form PCT/IB/306 changing name of Inventor Alison Jane Wassell</p> <p>Form PCT/IB/306 changing address of Inventor Gary Anthony Jubb</p> <p>Certificate of Mailing under Express Mail Label No. EM216268121US</p> 			

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)		INTERNATIONAL APPLICATION NO. PCT/GB97/01667		ATTORNEY'S DOCKET NUMBER M8540/185343	
17. <input checked="" type="checkbox"/> The following fees are submitted BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1070.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$930.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2) paid to USPTO \$790.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$720.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$98.00 ENTER APPROPRIATE BASIC FEE AMOUNT =				CALCULATIONS PTO USE ONLY	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$	
Total claims	08 - 20 =	00	X \$18.00	\$	
Independent claims	04 - 03 =	01	X \$78.00	\$	78.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)				+ \$260.00	\$
TOTAL OF ABOVE CALCULATIONS =				\$1,008.00	
Reduction of ½ for filing by small entity, if applicable. A Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28)				--	
SUBTOTAL =				\$1,008.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$1,008.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40 per property				\$	40.00
TOTAL FEES ENCLOSED =				\$1,048.00	
				Amount to be refunded:	\$
				charged:	\$
<p>a. <input checked="" type="checkbox"/> A check in the amount of \$1,048.00 to cover the above fees is enclosed.</p> <p>b. <input type="checkbox"/> Please charge my Deposit Account No. 11-0855 in the amount of \$_____ to cover the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 11-0855. A duplicate copy of this sheet is enclosed.</p>					
<p>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b) must be filed and granted to restore the application to pending status.</p>					
<p>SEND ALL CORRESPONDENCE TO:</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>John S. Pratt, Esq.</p> <p>KILPATRICK STOCKTON LLP</p> <p>1100 Peachtree Street, Suite 2800</p> <p>Atlanta, Georgia 30309-4530</p> </div> <div style="width: 45%; text-align: center;">  <hr/> <p>SIGNATURE</p> <p>Name: Bruce D. Gray</p> <p>Registration No. Reg. No 35,799</p> </div> </div>					

09/202758

300 Rec'd PCT/PTO 21 DEC 1998

IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
(DO/EO/US)

Applicants: Gary Anthony Jubb,
Paul Nigel Eaton,
Philip John Canty,
and Alison Jane
Wassell (nee Alison
Jane Lowe)

International
Application No. PCT/GB97/01667

GROUP ART UNIT:

International
Filing Date: 20 June 1997

EXAMINER:

U.S. Filing Date 21 December 1998

FOR: SALINE SOLUBLE INORGANIC FIBRES

ATTORNEY DOCKET NO.:
M8540/185343

Box PCT
Assistant Commissioner for
Patents
Washington, D.C. 20231

DATE: 21 December 1998

PRELIMINARY AMENDMENT

Sir:

Preliminary to any examination on the merits, Applicants respectfully submit the following amendments and remarks in connection with the above-identified application.

IN THE CLAIMS

Please cancel claims 1-7 without prejudice or disclaimer to the subject matter contained therein.

Please add the following new claims.

--8. A method of increasing the refractoriness of inorganic fibers having a composition containing SiO_2 and CaO , or SiO_2 , CaO , and MgO , comprising:

(1) including in the fiber composition a P_2O_5 former in an amount such that:

(a) $\{\text{SiO}_2\} + (\{\text{P}_2\text{O}_5\} - (58 + 0.5(\{\text{MgO}\} - 10))) > -2.4 \text{ wt\%}$ if $\{\text{MgO}\} > 10 \text{ wt\%}$;

and

(b) $\{\text{SiO}_2\} + (\{\text{P}_2\text{O}_5\} - 58) > -2.4 \text{ wt\%}$ if $\{\text{MgO}\} \leq 10$; and optionally

(2) including in the fiber composition a B_2O_3 former such that $\{\text{B}_2\text{O}_3\}$ is in the range from 0 to 4 wt%;

wherein $\{\text{SiO}_2\}$, $\{\text{P}_2\text{O}_5\}$, $\{\text{MgO}\}$, and $\{\text{B}_2\text{O}_3\}$ are the concentrations of SiO_2 , P_2O_5 , MgO , and B_2O_3 , respectively, in the fiber in wt%;

thereby producing inorganic fibers having a shrinkage of less than 3.5% when exposed to a temperature of 1000 °C for 24 hours and a shrinkage of less than 3.5% when exposed to a temperature of 800 °C for 24 hours.--

--9. The method according to claim 8, wherein the fiber has a percentage of nonbridging oxygens, calculated based upon the above-named components, of less than 64.1%.--

--10. The method according to claim 8, wherein the fiber compositions contain concentrations of SiO_2 , CaO , and optionally MgO , P_2O_5 , and B_2O_3 falling within the ranges:

$\{\text{SiO}_2\}$ 44 wt% or more;

$\{\text{CaO}\}$ 20 - 40 wt%;

$\{\text{MgO}\}$ 0 - 18 wt%;

$\{\text{P}_2\text{O}_5\}$ 0 - 12.5 wt%; and

$\{\text{B}_2\text{O}_3\}$ 0 - 4 wt%

wherein $\{\text{CaO}\}$ is the concentration of CaO in the fiber in wt%.--

--11. The method according to claim 10, wherein the fiber compositions contain concentrations of SiO_2 , CaO , P_2O_5 , and optionally MgO and B_2O_3 falling within the ranges:

$\{\text{SiO}_2\}$	52 wt% to 58 wt%, when $\{\text{MgO}\} \leq 10$ wt%, and 52 wt% to $(58 + 0.5(\{\text{MgO}\} - 10))$ wt%, when $\{\text{MgO}\} > 10$ wt%;
$\{\text{CaO}\}$	22 wt% to 40 wt%;
$\{\text{MgO}\}$	0 wt% to 17.5 wt%;
$(\{\text{MgO}\} + \{\text{CaO}\})$	< 42 wt%;
$\{\text{P}_2\text{O}_5\}$	0.5 wt% to 10 wt%;
$\{\text{B}_2\text{O}_3\}$	0 wt% to 2 wt%.--

--12. The method according to claim 10, wherein the fiber compositions contain concentrations of SiO_2 , CaO , MgO , and optionally P_2O_5 and B_2O_3 falling within the ranges:

$\{\text{SiO}_2\}$	44.34 wt% to 62.48 wt%;
$\{\text{CaO}\}$	20.36 wt% to 39.4 wt%;
$\{\text{MgO}\}$	0.62 wt% to 21.16 wt%;
$\{\text{P}_2\text{O}_5\}$	0 wt% to 12.01 wt%;
$\{\text{B}_2\text{O}_3\}$	0 wt% to 3.54 wt%.--

--13. A saline soluble inorganic fiber having a shrinkage of less than 3.5% when exposed to a temperature of 1000 °C for 24 hours and having a shrinkage of less than 3.5% when exposed to a temperature of 800 °C for 24 hours, comprising SiO_2 , CaO , P_2O_5 , and optionally MgO and B_2O_3 in concentrations falling within the ranges:

$\{\text{SiO}_2\}$	52 wt% to 58 wt%, when $\{\text{MgO}\} \leq 10$ wt%, and 52 wt% to $(58 + 0.5(\{\text{MgO}\} - 10))$ wt%, when $\{\text{MgO}\} > 10$ wt%;
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{CaO}	22 wt% to 40 wt%;
{MgO}	0 wt% to 17.5 wt%;
{MgO} + {CaO}	< 42 wt%;
{P ₂ O ₅ }	0.5 wt% to 10 wt%; and
{B ₂ O ₃ }	0 wt% to 2 wt%;

wherein {SiO₂}, {CaO}, {MgO}, {P₂O₅}, and {B₂O₃} are the concentrations of SiO₂, CaO, MgO, P₂O₅, and B₂O₃, respectively, in the fiber in wt%, and wherein

(a) $\{SiO_2\} + (\{P_2O_5\} - (58 + 0.5(\{MgO\} - 10))) > -2.4 \text{ wt\%}$ if $\{MgO\} > 10 \text{ wt\%}$;

and

(b) $\{SiO_2\} + (\{P_2O_5\} - 58) > -2.4 \text{ wt\%}$ if $\{MgO\} \leq 10$; and

wherein the percentage of nonbridging oxygens calculated based upon the above-named components is less than 61.4%.--

--14. A saline soluble inorganic fiber having a shrinkage of less than 3.5% when exposed to a temperature of 1000 °C for 24 hours and having a shrinkage of less than 3.5% when exposed to a temperature of 800 °C for 24 hours, comprising SiO₂, CaO, MgO, and optionally P₂O₅ and B₂O₃ in concentrations falling within the ranges:

{SiO ₂ }	44.34 wt% to 62.48 wt%;
{CaO}	20.36 wt% to 39.4 wt%;
{MgO}	0.62 wt% to 21.16 wt%;
{P ₂ O ₅ }	0 wt% to 12.01 wt%;
{B ₂ O ₃ }	0 wt% to 3.54 wt%;

wherein {SiO₂}, {CaO}, {MgO}, {P₂O₅}, and {B₂O₃} are the concentrations of SiO₂, CaO, MgO, P₂O₅, and B₂O₃, respectively, in the fiber, and wherein

(a) $\{SiO_2\} + (\{P_2O_5\} - (58 + 0.5(\{MgO\} - 10))) > -2.4 \text{ wt\%}$ if $\{MgO\} > 10 \text{ wt\%}$;

and

(b) $\{SiO_2\} + (\{P_2O_5\} - 58) > -2.4 \text{ wt\%}$ if $\{MgO\} \leq 10$.--

--15. A saline soluble inorganic fiber having a shrinkage of less than 3.5% when exposed to a temperature of 1000 °C for 24 hours and having a shrinkage of less than 3.5% when exposed to a temperature of 800 °C for 24 hours, comprising SiO₂, CaO, MgO, P₂O₅, and optionally B₂O₃, and Al₂O₃ in concentrations falling within the ranges:

{SiO ₂ }	52.4 wt% to 57.85 wt%;
{CaO}	22.2 wt% to 39.4 wt%;
{MgO}	1.96 wt% to 17.4 wt%;
{P ₂ O ₅ }	0.82 wt% to 7.8 wt%;
{B ₂ O ₃ }	0 wt% to 1.95 wt%; and
{Al ₂ O ₃ }	< 1 wt%;

wherein {SiO₂}, {CaO}, {MgO}, {P₂O₅}, {B₂O₃}, and {Al₂O₃} are the concentrations of SiO₂, CaO, MgO, P₂O₅, B₂O₃, and Al₂O₃, respectively, in the fiber in wt%,

(a) $\{SiO_2\} + (\{P_2O_5\} - (58 + 0.5(\{MgO\} - 10))) > -2.4 \text{ wt\%}$ if $\{MgO\} > 10 \text{ wt\%}$;

and

(b) $\{SiO_2\} + (\{P_2O_5\} - 58) > -2.4 \text{ wt\%}$ if $\{MgO\} \leq 10$.--

REMARKS

Applicants have replaced existing claims 1-7 with new claims 8-15 in order to more closely comply with U.S. claim format. These new claims are fully supported by the original claims, and thus no new matter has been added. Further, no restriction of the scope of the original claims was intended by this amendment.

An early and favorable action on the merits is earnestly solicited.

U.S. National Phase Entry of
International Application No. PCT/GB97/01667
Filed: 21 December 1998
PRELIMINARY AMENDMENT

Please charge any additional fees or credit any overpayment to Deposit Order Account
No. 11-0855.

Respectfully submitted,



Bruce D. Gray
Reg. No. 35,799

OF COUNSEL:

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404-815-6218
Attorney Docket No.: M8540/185343

09/202,158

SALINE SOLUBLE INORGANIC FIBRES

This invention relates to saline soluble inorganic fibres.

Saline soluble inorganic fibres have been described in several patent specifications, see for example WO93/15028. Fibres are required to be soluble in saline solution so that inhaled or ingested fibres dissolve rather than providing a source of irritation or otherwise affecting health. WO93/15028 showed that fibres comprising SiO_2 , CaO and MgO and having a silica content of greater than 58% (or greater than 58% plus 0.5 times ($\text{wt}\%\text{MgO} - 10$) if $\text{MgO} > 10\text{wt}\%$) had suitable shrinkage characteristics at 800°C and 1000°C to be usable as refractory materials. A further feature of WO93/15028 was the use of the percentage of non-bridging oxygens present to predict the solubility of fibres in physiological saline solution.

Various subsequent applications have described the effect of P_2O_5 and B_2O_3 on solubility - see for example WO95/29135. P_2O_5 is alleged to have a solubilising effect on such fibres. WO93/22251 refers to use of P_2O_5 and Na_2O to improve solubility of fibres. WO89/12032 and DE 4417230 disclose fibres containing SiO_2 , CaO , MgO , and B_2O_3 .

The German government have proposed a fibre classification which turns on a variable K_I which is defined as:

$$K_I = \Sigma(\text{Na, K, B, Ca, Mg, Ba -oxide}) - 2 * \text{Al-oxide}$$

(the amounts of the oxides being expressed as weight %)

According to the proposed fibre classification if K_I is greater than 40 the fibre requires no health warnings. If K_I lies between 30 and 40 the fibre requires health warnings to be made. If K_I is less than 30 more serious marking is required (it is labelled as a carcinogen). It is readily apparent that it is difficult to provide a high K_I fibre ($K_I > 40$) while still providing a refractory fibre like that of WO93/15028 ($\text{SiO}_2 > 58\text{wt}\%$), there being a very narrow window of compositions to meet.

As a result of investigating fibre compositions that may meet the fibre classification and yet still be refractory enough to meet the standard of WO93/15028 (shrinkage of less than 3.5% at both 800°C and 1000°C) the applicants have found that addition of P_2O_5 to compositions allows a broader range of refractory fibres to be produced than had previously been appreciated.

They have also found that B_2O_3 , previously thought to be extremely detrimental to refractoriness, has a similar, although lesser, effect and that both P_2O_5 and B_2O_3 may be used in the fibres of WO93/15028.

The applicants have found that the refractoriness of the P_2O_5 and B_2O_3 containing fibres of the present invention is dependent on the sum of the amounts of SiO_2 and P_2O_5 (expressed in wt%)

It appears that a further factor that may be important in determining the refractoriness of a fibre is the percentage of non-bridging oxygens. If this percentage is 61.4% or more (calculated on the basis of the amounts of the components SiO_2 , CaO , MgO , P_2O_5 , and B_2O_3) the fibres tend to fail shrinkage tests at 800°C and 1000°C (failure being defined as a shrinkage of 3.5% or more).

The scope of the invention is apparent from the claims in the light of the following description.

The percentage of non-bridging oxygens (%N.B.O.) is calculated by converting the weight percentages of SiO_2 , CaO , MgO , P_2O_5 , and B_2O_3 to molar amounts and inserting these amounts into the equation:-

$$\%N.B.O. = \frac{2 * (CaO + MgO + P_2O_5 + B_2O_3)}{(2 * SiO_2 + CaO + MgO + 5 \times P_2O_5 + 3 \times B_2O_3)} \times 100$$

The reason the amounts of CaO , MgO , P_2O_5 , and B_2O_3 are doubled in the numerator to this equation is that each contributes two non-bridging oxygens. The reason terms are multiplied in the denominator to this equation is to reflect the number of oxygen atoms each molecular formula possesses.

Table I shows the results of a first set of shrinkage and solubility tests on compositions comprising SiO_2 , CaO , MgO , P_2O_5 , and B_2O_3 as main

AMENDED SHEET
IPE/EP

ingredients. In this table the analysed compositions are normalised to 100%. It is clear from these compositions that where the percentage of non-bridging oxygens calculated on the basis of the amounts of the above named components is greater than 61.4% (those fibres lying above line A of Table I) the fibres fail the shrinkage tests, having shrinkages of greater than 3.5% at either or both of 800°C and 1000°C.

WO93/15028 stressed the importance of alumina content and the fibres lying between lines B and A of Table I show that alumina contents of greater than 1wt% are damaging to the shrinkage properties of fibres.

The applicants have also found that the combined amount of CaO and MgO is important. Those fibres lying between lines C and B have a combined CaO and MgO content of greater than 42wt% and also fail the shrinkage tests.

The fibres below line C have a percentage of non-bridging oxygens less than 61.4%, an alumina content of less than 1wt%, and a combined CaO and MgO content of less than 42wt%. All of these fibres pass the shrinkage tests. These fibres fall within the compositional ranges:-

SiO ₂	52.4 - 57.85wt%
CaO	22.2 - 39.4wt%
MgO	1.96 - 17.4wt%
P ₂ O ₅	0.82 - 7.8wt%
B ₂ O ₃	0 - 1.95wt%
Al ₂ O ₃	<1wt%

The solubility results presented in Table I were obtained by the methods described in WO93/15028 and show a high solubility for all of the fibres produced.

It can be seen that all of the fibres below line C have a K_I of more than 35 and more than half have a K_I of more than 40.

Further testing resulted in the data presented in Table II. The data presented are as in table I but an additional column entitled deviation shows the result of looking to the difference between the sum of the SiO₂ and P₂O₅ contents and the SiO₂ amount predicted to be needed by WO93/15028 for a fibre to be refractory (shrinkage of less than 3.5% at both 800°C and 1000°C). The figure given is found by calculating the sum

$\text{SiO}_2 + \text{P}_2\text{O}_5 - (58 + (\text{if MgO} > 10, 0.5 \times (\text{MgO} - 10) \text{ else } 0))$

If this is less than -2.4wt% the fibres fail. The fibres that failed are shown in plain text, those that passed in bold text, and those that were difficult to form in italics.

More than 12.5wt% P_2O_5 is undesirable as it causes difficulties in making the fibres.

While the above description and the claims refer to P_2O_5 , B_2O_3 , SiO_2 , CaO and MgO it will be clear to the person skilled in the art that the pure materials need not be used and that provision of these components in combined form (e.g. provision of P_2O_5 in the form of mixed oxide phosphates) is part of the invention.

Table I

Code	Chemical Composition (XRF - Weight percent)												KI	Shrinkage		Solubility (ppm)				CaO+MgO	% NBO.
	CaO	MgO	P2O5	SiO2	Al2O3	Na2O	K2O	B2O3	Fe2O3	ZrO2	SiO	800°C		1000°C	CaO	MgO	SiO2	B2O3	Total		
LTP	24.95	19.18	3.41	51.69	0.25	0.30	0.05	<0.05	0.17	<0.05	<0.05	44.0	40.0	40.0	53	98	177		328	44.14	68.5%
LTP 8	24.81	18.66	5.10	50.42	0.38	0.31	<0.05	0.17	0.15	<0.05	<0.05	43.0	23.9	38.8	59	115	193		367	43.47	68.1%
LTP 9	25.13	19.07	2.51	52.54	0.28	0.25	0.05	0.17	<0.05	<0.05	<0.05	43.9	46.8	39.1	55	94	174		323	44.20	68.0%
LTP11	31.83	12.27	3.39	51.59	0.26	0.42	0.06	0.17	<0.05	<0.05	<0.05	44.1	49.1		79	76	200		355	44.11	66.1%
LTP16	24.48	17.89	2.48	54.46	0.21	0.28	0.05	0.16	<0.05	<0.05	<0.05	42.3	3.62	19.1	58	90	169		317	42.37	64.7%
LTP10	24.04	17.78	3.31	53.85	0.31	0.26	0.05	0.15	0.25	<0.05	<0.05	41.5	3.71	4.77	56	95	180		331	41.83	64.3%
LTP 4	24.22	17.17	4.91	52.72	0.33	0.30	<0.05	0.14	0.21	<0.05	<0.05	41.0	3.63	5.39	65	106	191		362	41.40	64.1%
LTP 5	38.39	5.54	3.41	51.22	0.40	0.42	0.07	0.16	0.38	<0.05	<0.05	43.6	45.2	43.8	83	32	191		306	43.94	63.9%
LTP17	38.62	5.56	2.57	52.23	0.34	0.46	0.07	0.15	<0.05	<0.05	<0.05	44.0	42.90		82	29	199		310	44.18	63.7%
LTP23	30.93	11.01	4.90	51.96	0.30	0.45	0.05	0.15	0.25	<0.05	<0.05	41.8	3.24	3.92	78	69	191		338	41.95	63.0%
LTP14	11.28	27.95	3.26	57.2	<0.05	0.13	<0.05	0.17	<0.05	<0.05	<0.05	39.4	5.72	5.26	30	117	188		335	39.23	63.0%
LTP13	30.93	11.35	3.36	53.52	0.32	0.31	0.06	0.15	<0.05	<0.05	<0.05	42.0	2.55	30.1	82	72	207		361	42.27	62.6%
LTP12	31.05	11.35	2.52	54.14	0.32	0.31	0.06	0.16	0.10	<0.05	<0.05	42.1	3.38	29.7	85	71	200		356	42.40	62.6%
LTP20	36.89	5.70	5.05	51.22	0.31	0.43	0.10	0.16	0.13	<0.05	<0.05	42.5	3.41	5.03	88	35	204		327	42.59	62.2%
LTP15	22.89	16.69	6.70	52.58	0.25	0.29	<0.05	0.14	0.46	<0.05	<0.05	39.4	23.3	29.5	43	166	141		350	39.58	61.9%
LTP 3	10.37	27.85	3.29	58.18	<0.05	0.15	<0.05	0.16	<0.05	<0.05	<0.05	38.4	10.9	15.5	36	132	152		320	38.23	61.4%
LTP 7																					A
LTP52	24.9	11.5	4.89	54.8	2.06	0.28	0.05	<0.05	1.38	<0.05	<0.05	32.6	32.1		72	74	140		286	36.40	56.0%
LTP51	28.7	11	1.62	56.6	1.38	0.29	0.07	<0.05	0.26	<0.05	<0.05	37.3	3.07	3.61	82	69	159		310	39.70	58.4%
LTP29	40.29	2.09	1.23	55.09	0.43	0.39	0.12	0.19	0.17	<0.05	<0.05	42.0	45.9		76	10	206		292	42.38	58.8%
LTP21	36.62	5.58	2.54	54.19	0.39	0.46	0.07	0.15	<0.05	<0.05	<0.05	42.0		35.5	58	34	208		300	42.20	60.3%
LTP30	39.40	1.96	2.22	55.25	0.45	0.41	0.10	0.21	<0.05	<0.05	<0.05	41.0	1.74	2.04	72	11	209		292	41.36	57.5%
LTP41	31.36	9.48	0.85	55.63	0.27	0.30	0.07	1.88	0.16	<0.05	<0.05	42.5	1.20	2.32	87	60	194	20	361	40.84	60.0%
LTP 6	29.83	10.45	3.34	55.65	0.21	0.32	0.05	0.15	<0.05	<0.05	<0.05	40.2	1.89	2.76	65	52	172		289	40.28	59.0%
LTP34	30.44	9.81	1.68	57.3	0.25	0.31	0.07	0.15	<0.05	<0.05	<0.05	40.1	1.40	1.79	76	51	188		315	40.25	58.0%
LTP43	30.51	9.68	1.68	56.19	0.28	0.32	0.07	1.11	0.15	<0.05	<0.05	41.1	0.97	1.84	62	66	187	12	327	40.19	58.8%
LTP42	30.55	9.56	0.86	57.13	0.27	0.33	0.07	1.08	0.15	<0.05	<0.05	41.1	1.04	1.81	75	65	192	12	344	40.12	58.2%
LTP47	22.2	17.4	3.98	55.2	0.31	0.31	0.05	<0.05	0.1	<0.05	<0.05	39.3	1.97	2.14	58	104	197		359	39.60	61.0%
LTP38	34.82	4.73	0.82	57.84	0.31	0.30	0.08	0.94	0.15	<0.05	<0.05	40.3	1.07	1.40	83	25	175	9	292	39.56	55.4%
LTP 2	23.35	16.10	4.87	54.25	0.46	0.24	<0.05	0.16	0.58	<0.05	<0.05	38.8	2.24	3.05	53	96	167		316	39.45	60.8%
LTP39	34.35	4.73	1.67	57.39	0.27	0.30	0.08	1.06	0.14	<0.05	<0.05	40.0	1.47	1.93	32	33	203	16	284	39.08	55.2%
LTP 1	23.29	15.66	3.33	57.01	0.24	0.22	0.06	0.14	<0.05	0.05	38.7	38.7	1.31	1.77	63	89	175		327	38.94	58.7%
LTP48	32	6.87	7.8	52.4	0.52	0.34	0.05	<0.05	0.15	0.18	<0.05	38.2	1.24	1.53	84	48	205		337	38.87	57.7%
LTP40	33.67	4.75	0.86	57.85	0.38	0.31	0.08	1.95	0.15	<0.05	<0.05	40.0	1.15	2.39	40	32	194	25	291	38.42	54.5%
LTP26	33.69	4.56	3.73	56.95	0.36	0.43	0.06	0.14	0.07	<0.05	<0.05	38.0	1.22	1.40	91	28	193		312	38.25	54.0%
LTP27	28.91	9.33	3.66	57.32	0.22	0.36	0.05	0.14	<0.05	<0.05	<0.05	38.2	0.99	1.16	67	48	173		288	38.24	55.5%
LTP46	28.4	8.69	2.67	59	0.29	0.33	0.06	<0.05	0.13	<0.05	<0.05	36.9	0.91	0.99	71	46	175		292	37.09	53.3%

TABLE II (Part I)

Code	Chemical Composition (XRF - Weight percent)										KI	Shrinkage		Solubility (ppm)				Total	CaO+MgO	% N.B.O.
	CaO	MgO	P2O5	SiO2	Al2O3	Na2O	K2O	B2O3	Fe2O3	ZrO2	SrO	800°C	1000°C	CaO	MgO	SiO2	B2O3			
LTP 8	24.95	19.18	3.41	51.69	0.25	0.30	0.05		0.17			40.00	40.00	53	98	177		328	44.14	68.5%
LTP11	25.13	19.07	2.51	52.54	0.28	0.25	0.05		0.17			46.80	39.10	55	94	174		323	44.20	68.0%
LTP49	32.35	6.74		50.54	0.57	0.40	0.08	9.17	0.14			2.65	15.70	79	41	214	129	463	39.09	62.1%
LTP 9	24.81	18.66	5.10	50.42	0.38	0.31			0.17	0.15		23.90	38.80	59	115	193		367	43.47	68.1%
LTP67	15.17	25.18	5.06	54.00	0.19	0.25			0.15			5.70	-	30	117	188		335	40.35	64.9%
LTP13	11.28	27.95	3.26	57.20		0.13			0.17			5.72	5.26	30	117	188		335	39.23	63.0%
LTP62	14.99	24.54	2.52	57.24	0.35	0.19			0.16			4.48	-	25	66	119		210	39.53	62.3%
LTP 7	10.37	27.85	3.29	58.18		0.15			0.16			10.90	15.50	36	132	152		320	38.23	61.4%
LTP10	24.48	17.89	2.48	54.46	0.21	0.28	0.05		0.16			3.62	19.10	58	90	169		317	42.37	64.7%
LTP 4	24.04	17.78	3.31	53.85	0.31	0.26	0.05		0.15	0.25		3.71	4.77	56	95	180		331	41.83	64.3%
LTP16	31.83	12.27	3.39	51.59	0.26	0.42	0.06		0.17			49.10	-	79	76	200		355	44.11	66.1%
LTP 5	24.22	17.17	4.91	52.72	0.33	0.30			0.14	0.21		3.63	5.39	65	106	191		362	41.40	64.1%
LTP59	32.13	10.47	12.93	41.37	2.31	0.56	0.05		0.17			43.20	-	42	41	179		262	42.60	69.3%
LTP50	31.00	10.40		54.50	0.36	0.31	0.08	3.19	0.16			29.80	-	79	58	200	30	367	41.40	62.0%
LTP17	38.39	5.54	3.41	51.22	0.40	0.42	0.07		0.16	0.38		45.20	43.80	83	32	191		306	43.94	63.9%
LTP56	34.38	9.46	14.72	40.02	0.72	0.55			0.16			9.98	-	60	57	196		313	43.84	70.5%
LTP23	38.62	5.56	2.57	52.23	0.34	0.46	0.07		0.15			42.90	-	82	29	199		310	44.18	63.7%
LTP57	34.73	9.55	19.83	35.24	0.23	0.26			0.15			-	-	75	73	255	21	424	38.58	58.7%
LTP70	24.38	14.20		57.52	0.44	0.18	0.08	3.01	0.18			3.63	7.86	17	108	83		208	37.48	58.4%
LTP63	14.61	22.87	2.53	59.45	0.27	0.12			0.16			9.57	-							
Above here compositions have deviation of more than 2.4wt%																				
LTP54	29.40	8.73	14.55	46.68	0.07	0.44			0.13			-	-	38.43	-	-	-		38.13	60.1%
LTP61	32.46	9.86	14.02	42.67	0.09	0.70	0.05		0.15			3.44	3.65	42.89	-	-	-		42.32	67.4%
LTP60	31.46	9.58	12.64	44.91	0.69	0.54	0.05		0.14			-	-	40.25	-	-	-		41.04	64.8%
Above here compositions have P2O5 content more than 12.5wt%																				
LTP52	24.93	11.52	4.90	54.88	2.06	0.28	0.05		1.38			32.66	32.10	72	74	140		286	36.45	56.1%
LTP51	28.72	11.01	1.62	56.65	1.38	0.29	0.07		0.26			37.33	3.07	82	69	159		310	39.73	58.4%
Above here fibres have Al2O3 content above 1 wt%																				
LTP15	36.89	5.70	5.05	51.22	0.31	0.43	0.10		0.16	0.13		3.41	5.03	88	35	204		327	42.59	62.2%
LTP14	30.93	11.01	4.90	51.96	0.30	0.45	0.05		0.15	0.25		3.24	3.92	78	69	191		338	41.95	63.0%
LTP58	32.93	9.77	12.01	44.34	0.19	0.53	0.05		0.19			2.62	2.78	57	42	223		322	42.70	67.0%
LTP55	32.58	9.47	9.65	46.79	0.84	0.46	0.05		0.17			1.72	1.95	71	54	203		328	42.05	65.1%
LTP53	29.34	9.84	9.58	50.26	0.17	0.56	0.05		0.15	0.05		0.01	0.00	71	83	222		376	39.18	60.1%
Above here SiO2 content less than 52wt%																				

TABLE II (Part 2)

Code	Chemical Composition (XRF - Weight Percent)										KI	Shrinkage		Solubility (ppm)				CaO+MgO	% N.B.O.
	CaO	MgO	P2O5	SiO2	Al2O3	Na2O	K2O	B2O3	Fe2O3	ZrO2	SiO	800°C	1000°C	CaO	MgO	SiO2	B2O3	Total	
LTP	22.89	16.69	6.70	52.58	0.25	0.29			0.14	0.46		39.37	23.30	43	166	141		350	61.9%
LTP3	21.05	11.35	2.52	54.14	0.32	0.31	0.06		0.16	0.10		42.13	29.70	85	71	200		356	62.6%
LTP20	23.35	16.10	4.87	54.25	0.46	0.24			0.16	0.58		38.77	2.24	53	96	167		316	60.8%
LTP12	30.93	11.35	3.36	53.52	0.32	0.31	0.06		0.15			42.00	2.55	82	72	207		361	62.6%
LTP21	36.62	5.58	2.54	54.19	0.39	0.46	0.07		0.15			41.95	-	58	34	208		300	60.3%
LTP48	31.90	6.85	7.78	52.24	0.52	0.34	0.05		0.15	0.18		38.10	1.24	84	48	205		337	57.9%
Above here SiO2 content 52wt% to less than 55wt%																			
LTP47	22.30	17.48	4.00	55.45	0.31	0.31	0.05		0.10			39.52	1.97	58	104	197		359	61.0%
LTP64	20.81	18.41	2.52	57.63	0.22	0.26			0.14			39.04	3.01	46	76	197		319	59.7%
LTP68	20.08	18.77	4.55	55.92	0.30	0.24			0.14			38.49	3.90	51	89	226		366	60.2%
LTP29	40.29	2.09	1.23	55.09	0.43	0.39	0.12		0.19	0.17		42.03	45.85	76	10	206		292	58.8%
LTP41	31.36	9.48	0.85	55.63	0.27	0.30	0.07	1.88	0.16			42.55	1.20	87	60	194	20	361	60.0%
LTP71	38.31	0.65		56.51	0.55	0.20	0.09	3.54	0.14			41.69	0.59	73	2	278	55	408	54.9%
LTP30	39.40	1.96	2.22	55.25	0.45	0.41	0.10		0.21			40.96	1.74	72	11	209		292	57.5%
LTP1	23.29	15.66	3.33	57.01	0.24	0.22	0.06		0.14			38.74	1.31	63	89	175		327	58.7%
LTP43	30.51	9.68	1.68	56.19	0.28	0.32	0.07	1.11	0.15			41.13	0.97	62	66	187	12	327	58.8%
LTP37	35.40	4.77		57.92	0.31	0.31	0.09	1.05	0.15			40.99	1.57	37	30	195	13	275	56.1%
LTP32	30.01	8.53		57.95	0.32	0.23	0.09	2.69	0.18			40.92	1.68	80	46	184	24	334	56.3%
LTP73	36.93	0.62		57.96	0.49	0.23	0.09	3.54	0.13			40.43	1.23	76	2	264	40	382	52.6%
LTP42	30.55	9.56	0.86	57.13	0.27	0.33	0.07	1.08	0.15			41.06	1.04	75	65	192	12	344	58.2%
LTP38	34.82	4.73	0.82	57.84	0.31	0.30	0.08	0.94	0.15			40.26	1.07	83	25	175	9	292	55.4%
LTP40	33.67	4.75	0.86	57.85	0.38	0.31	0.08	1.95	0.15			40.00	1.15	40	32	194	25	291	54.5%
LTP6	29.83	10.45	3.34	55.65	0.21	0.32	0.05		0.15			40.23	1.89	65	52	172		289	59.0%
LTP69	19.17	17.56	4.66	57.93	0.31	0.23			0.13			36.34	1.23	49	88	241		378	56.5%
LTP34	30.44	9.81	1.68	57.30	0.25	0.31	0.07		0.15			40.13	1.40	76	51	188		315	58.0%
LTP39	34.35	4.73	1.67	57.39	0.27	0.30	0.08	1.06	0.14			39.98	1.47	32	33	203	16	284	55.2%
LTP26	33.69	4.56	3.73	56.95	0.36	0.43	0.06		0.14	0.07		38.02	1.22	91	28	193		312	54.0%
LTP27	28.91	9.33	3.66	57.32	0.22	0.36	0.05		0.14			38.21	0.99	67	48	173		288	55.5%
Above here SiO2 content 55wt% to less than 58wt%																			

TABLE II (Part 3)

Code	Chemical Composition (XRF - Weight percent)											KI	Shrinkage		Solubility (ppm)				CaO+MgO	% N.B.O.		
	CaO	MgO	P2O5	SiO2	Al2O3	Na2O	K2O	B2O3	Fe2O3	ZrO2	SiO		800°C	1000°C	Deviation	CaO	MgO	SiO2			B2O3	Total
LTP																						
LTP66	15.65	21.16	4.38	58.17	0.24	0.25			0.15			36.58	2.65	3.19	-1.03	30	84	169		283	36.81	57.7%
LTP65	20.36	17.74	2.50	58.75	0.30	0.22			0.13			37.72	2.28	2.37	-0.62	41	68	185		294	38.10	57.6%
LTP72	22.67	13.60		59.64	0.37	0.27	0.06	3.25	0.14			39.11	3.37	6.16	-0.16	49	56	197	23	325	36.27	55.0%
LTP35	32.72	4.76		58.60	0.28	0.31	0.08	3.09	0.15			40.40	1.65	3.85	0.60	88	26	179	29	322	37.48	53.5%
LTP31	28.30	9.20		58.70	0.28	0.29	0.06	3.00	0.18			40.29	3.15	4.88	0.70	91	60	205	31	387	37.50	55.1%
LTP36	33.37	4.82		58.90	0.27	0.30	0.08	2.10	0.15			40.13	1.50	3.12	0.90	37	33	198	25	293	38.19	53.9%
LTP33	30.20	9.03		59.01	0.27	0.28	0.08	0.96	0.17			40.02	2.16	2.74	1.01	88	52	193	10	343	39.23	56.1%
LTP44	29.05	6.88		59.81	0.35	0.36	0.07	3.16	0.13	0.19		38.82	1.60	2.71	1.81	89	44	193	32	358	35.93	52.1%
LTP45	24.10	11.40		62.48	0.54	0.24	0.06	1.04	0.15			35.76	2.17	3.15	3.78	81	65	189	10	345	35.50	51.3%
LTP46	28.52	8.73	2.68	59.25	0.29	0.33	0.06		0.13			37.06	0.91	0.99	3.93	71	46	175		292	37.25	53.3%

Above here SiO2 content 58wt% or more

Above here SiO2 content 58wt% or more

CLAIMS

1. The use of either or both P_2O_5 and B_2O_3 as a component to improve the refractoriness of inorganic fibres comprising SiO_2 , and CaO and/or MgO, to produce inorganic fibres having a composition having a shrinkage of less than 3.5% when exposed to 1000°C for 24 hours and having a shrinkage of less than 3.5% when exposed to 800°C for 24 hours, the fibres having a composition:-

SiO_2	44wt% or more
CaO	20 – 40wt%
MgO	0 - 18wt%
P_2O_5	0- 12.5wt%
B_2O_3	0 - 4wt%

and in which

$$SiO_2 + P_2O_5 - (58 + (if\ MgO > 10, 0.5 \times (MgO - 10)\ else\ 0)) > - 2.4wt\%$$

2. The use of either or both P_2O_5 and B_2O_3 as a component to improve the refractoriness of inorganic fibres as claimed in claim 1 in which the percentage of non-bridging oxygens is less than 61.4%.
3. The use of either or both P_2O_5 and B_2O_3 as a component to improve the refractoriness of inorganic fibres as claimed in claim 1 in which the fibres fall within the compositional range:-

SiO_2	52 - <58wt% [52 - <58+0.5×(MgO-10)wt% if MgO > 10wt%]
CaO	22 - 40wt%
MgO	0 - 17.5wt%
MgO + CaO	< 42wt%
P_2O_5	0.5 - 10wt%
B_2O_3	0 - 2wt%

4. The use of either or both P_2O_5 and B_2O_3 as a component to improve the refractoriness of inorganic fibres in which the fibres fall within the compositional range:-

SiO_2	44.34 - 62.48
CaO	20.36 - 39.4wt%
MgO	0.62 - 21.16wt%
P_2O_5	0 - 12.01wt%
B_2O_3	0 - 3.54wt%

and in which

$$SiO_2 + P_2O_5 - (58 + (if MgO > 10, 0.5 \times (MgO - 10) \text{ else } 0)) > -2.4wt\%$$

5. Saline soluble inorganic fibres having a shrinkage of less than 3.5% when exposed to $1000^\circ C$ for 24 hours and having a shrinkage of less than 3.5% when exposed to $800^\circ C$ for 24 hours, in which:-

$$SiO_2 + P_2O_5 - (58 + (if MgO > 10, 0.5 \times (MgO - 10) \text{ else } 0)) > -2.4wt\%$$

and comprising:-

SiO_2	52 - <58wt% [52 - <58+0.5'(MgO-10)wt% if MgO > 10wt%]
CaO	22 - 40wt%
MgO	0 - 17.5wt%
$MgO + CaO$	< 42wt%
P_2O_5	0.5 - 10wt%
B_2O_3	0 - 2wt%

and in which the percentage of non-bridging oxygens calculated on the basis of the amounts of the above named components is less than 61.4%.

6. Saline soluble inorganic fibres having a shrinkage of less than 3.5% when exposed to $1000^\circ C$ for 24 hours and having a shrinkage of less than 3.5% when exposed to $800^\circ C$ for 24 hours, in which:-

$$SiO_2 + P_2O_5 - (58 + (if MgO > 10, 0.5 \times (MgO - 10) \text{ else } 0)) > -2.4wt\%$$

and comprising:-

SiO_2	44.34 - 62.48
CaO	20.36 - 39.4wt%
MgO	0.62 - 21.16wt%

and also comprising either or both of:-

P_2O_5	0 - 12.01wt%
B_2O_3	0 - 3.54wt%

7. Saline soluble inorganic fibres having a shrinkage of less than 3.5% when exposed to 1000°C for 24 hours and having a shrinkage of less than 3.5% when exposed to 800°C for 24 hours, in which:-

$\text{SiO}_2 + \text{P}_2\text{O}_5 - (58 + (\text{if MgO} > 10, 0.5 \times (\text{MgO} - 10) \text{ else } 0)) > - 2.4\text{wt}\%$

and comprising:-

SiO_2	52.4 - 57.85wt%
CaO	22.2 - 39.4wt%
MgO	1.96 - 17.4wt%
P_2O_5	0.82 - 7.8wt%
B_2O_3	0 - 1.95wt%
Al_2O_3	<1wt%

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
(Includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NUMBER

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

the specification of which (check only one item below):



is attached hereto



was filed as United States application

Serial No. _____

on _____

and was amended

on _____ (if applicable).



was filed as PCT international application

Number PCT/GB97/01667

on 20th June 1997,

and was amended under PCT Article 19

on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United State code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

COUNTRY (of PCT indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119	
United Kingdom	9613023.2	21 June 1996	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONTINUED) (Includes Reference to PCT International Applications)				ATTORNEY DOCKET NUMBER	
I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:					
PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:					
U.S. APPLICATIONS			STATUS (Check One)		
U.S. APPLICATION NUMBER	U.S. FILING DATE		PATENTED	PENDING	ABANDONED
PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)			
POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. <i>(List name and registration number)</i> Charles Y. Lackey 22,707; John M. Harrington 25,592; John S. Pratt 29,476; James L. Ewing, IV 30,630; Roy D. Meredith 30,777; Charles W. Calkins 31,814; Michael D. Bednarek 32,329; Dale Curtis Hogue, Sr. 32,823; George T. Marcou 33,014; Sherry M. Knowles 33,052; Dean W. Russell 33,452; Richard A. Clegg 33,485; Andrew Knowles 33,525; Richard T. Peterson 35,320; Charles T. Simmons 35,359; Bruce D. Gray 35,799; Theodore R. Harper 35,890; Geoff L. Sutcliffe 36,348; George C. Beck 38,072; Nagendra Setty 38,300; Nancy Talavera Wood 38,334; Mike S. Ryu 38,604; Mitchell G. Stockwell 39,389; Michael F. Labbee 39,738; Mitchell G. Weatherly P40,864					
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statement may jeopardize the validity of the application or any patent issuing thereon.					
SIGNATURE OF INVENTOR 201			SIGNATURE OF INVENTOR 202		
Gay A Jubb			P. N. Eakin		
DATE 15/12/98			DATE 15/12/98		
SIGNATURE OF INVENTOR 203			SIGNATURE OF INVENTOR 204		
P. J. Coady			A. J. Wassell		
DATE 15-12-98			DATE 15.12.98		